

In the Claims:

1. (Currently Amended) Apparatus embodied in a computer for building a stochastic model of a data sequence, said data sequence comprising time related symbols selected from a finite symbol set, the apparatus comprising:

an input configured for receiving said data sequence, wherein said data sequence describes ongoing states of an observed process,

a tree builder, configured for expressing said data sequence as a stochastic model, said stochastic model comprising said symbols as a series of counters within nodes, each node having a counter for each symbol, each node having a position within said tree, said position expressing a symbol sequence and each counter indicating a number of its corresponding symbol which follows a symbol sequence of its respective node,

a tree reducer, configured for reducing said tree to an irreducible set of conditional probabilities of relationships between symbols in said input data sequence, and

a comparator configured for comparing said reduced tree with a reference tree obtained in advance of said receiving sequential data so as to determine whether there has been a statistical change between said two trees, and for outputting a result of said comparing~~an analysis of said monitored process in accordance with said comparing,~~

wherein said data sequence is selected from a group consisting of: a manufacturing process output data sequence, a cyclic operating machine data sequence, a buffer level data sequence, a seismological data sequence, a medical sensor output data sequence, a sequence of financial data, a sequence of records arriving at a database, and an image data sequence.

2. (Original) Apparatus according to claim 1, said tree reducer comprising a tree pruner for removing from said tree any node whose counter values are within a threshold distance of counter values of a preceding node in said tree.

3. (Original) Apparatus according to claim 2, wherein said threshold distance and tree construction parameters are user selectable.

4. (Original) The apparatus of claim 3, wherein said user selectable parameters further comprise a tree maximum depth.
5. (Original) The apparatus of claim 3, wherein said user selectable parameters further comprise an algorithm buffer size
6. (Original) The apparatus of claim 3, wherein said user selectable parameters further comprise values of pruning constants.
7. (Original) The apparatus of claim 3, wherein said user selectable parameters further comprise a length of input sequences.
8. (Original) The apparatus of claim 3 wherein, said user selectable parameters further comprise an order of input symbols.
9. (Original) Apparatus according to claim 2, wherein said tree reducer further comprises a path remover operable to remove any path within said tree that is a subset of another path within said tree.
10. (Original) Apparatus according to claim 1, wherein said sequential data is a string comprising consecutive symbols selected from a finite set.
11. (Currently Amended) The apparatus of claim 10, further comprising an input string permutation unit configured for carrying out permutations and reorganizations of the input string using external information about a process generating said string.
- 12-13. (Canceled)
14. (Currently amended) Apparatus according to claim 11, wherein said observed process comprises feedback.

15. (Currently Amended) Apparatus according to claim 1, wherein said sequential data sequence comprises a seismological data sequence, and wherein said comparator is configured for providing said comparison result as a forecast of seismological activity.

16. (Currently Amended) Apparatus according to claim 1, wherein said sequential data sequence comprises is an output of a medical sensor output data sequencesensing bodily functions, and wherein said apparatus is further configured for monitoring a selected bodily function.

17. (Currently amended) Apparatus according to claim 16, wherein said medical sensor output data comprises visual image data and said medical sensor is a medical imaging device.

18. (Canceled)

19. (Currently Amended) Apparatus embodied in a computer for determining statistical consistency in time sequential data, the apparatus comprising
a sequence input configured for receiving sequential data, wherein said data sequence describes ongoing states of an observed process,
a stochastic modeler configured for producing at least one stochastic model from at least part of said sequential data,
and a comparator configured for comparing said sequential stochastic model with a reference model obtained in advance of said receiving sequential data so as to determine whether there has been a statistical change in said model, and for outputting a result of said comparingan analysis of said monitored process in accordance with said comparing,

wherein said data sequence is selected from a group consisting of: a manufacturing process output data sequence, a cyclic operating machine data sequence, a buffer level data sequence, a seismological data sequence, a medical sensor output data sequence, a sequence of financial data, a sequence of records arriving at a database, and an image data sequence.

20. (Currently Amended) Apparatus according to claim 19, wherein said stochastic modeler comprises:

a tree builder configured for expressing said symbols as a series of counters within nodes, each node having a counter for each symbol, each node having a position within said tree, said position expressing a symbol sequence and each counter indicating a number of its corresponding symbol which follows a symbol sequence of its respective node, and

a tree reducer configured for reducing said tree to an irreducible set of conditional probabilities of relationships between symbols in said input data sequence.

21. (Previously Presented) Apparatus according to claim 19, said reference model being a model constructed using another part of said time-sequential data.

22. (Currently Amended) Apparatus according to claim 19, said comparator comprising a statistical processor configured for determining a statistical distance between said stochastic model and said reference model.

23. (Original) Apparatus according to claim 22, said statistical distance being a KL statistic.

24. (Original) Apparatus according to claim 22, said statistical distance being a relative complexity measure.

25. (Original) Apparatus according to claim 22, wherein said statistical distance comprises an SPRT statistic.

26. (Original) Apparatus according to claim 22, wherein said statistical distance comprises an MDL statistic.

27. (Original) Apparatus according to claim 22, wherein said statistical distance comprises a Multinomial goodness of fit statistic.

28. (Original) Apparatus according to claim 22, wherein said statistical distance comprises a Weinberger Statistic.

29. (Currently Amended) Apparatus according to claim 20, said tree reducer comprising a tree pruner configured for removing from said tree any node whose counter values are within a threshold distance of counter values of a preceding node in said tree.

30. (Original) Apparatus according to claim 29, wherein said threshold distance is user selectable.

31. (Original) The apparatus of claim 30, wherein user selectable parameters further comprise a tree maximum depth.

32. (Original) The apparatus of claim 30, wherein user selectable parameters further comprise an algorithm buffer size.

33. (Original) The apparatus of claim 30, wherein user selectable parameters further comprise values of pruning constants.

34. (Original) The apparatus of claim 30, wherein user selectable parameters further comprise a length of input sequences.

35. (Original) The apparatus of claim 30, wherein user selectable parameters further comprise an order of input symbols.

36. (Original) Apparatus according to claim 29, wherein said tree reducer further comprises a path remover operable to remove any path within said tree that is a subset of another path within said tree.

37. (Original) Apparatus according to claim 19, wherein said sequential data is a string comprising consecutive symbols selected from a finite set.

38. (Currently Amended) The apparatus of claim 37, further comprising an input string permutation unit configured for carrying out permutations and reorganizations of said sequential data using external information about a process generating said data.

39. (Canceled).

40. (Currently amended) Apparatus according to claim ~~39~~19, wherein said observed process comprises feedback.

41. (Currently amended) Apparatus according to claim 19, wherein said ~~sequential data~~ sequence comprises a seismological data sequence, and wherein said comparator is configured for providing said comparison result as a forecast of seismological activity.

42. (Currently amended) Apparatus according to claim 19, wherein said ~~sequential data sequence comprises~~ is an output of a medical sensor output data sequencesensing bodily functions, and wherein said apparatus is further configured for monitoring a selected bodily function.

43. (Canceled)

44. (Currently Amended) Apparatus according to claim 22, wherein said data sequence comprises indications of a process state, the apparatus further comprising a process analyzer configured for using said statistical distance measure as an indication of behavior of said process.

45. (Currently Amended) Apparatus according to claim 22, wherein said data sequence comprises indications of a process state, the apparatus further comprising a process controller configured for using said statistical distance measure as an indication of behavior of said process, thereby to control said process.

46. (Original) Apparatus according to claim 23, wherein said data sequence comprises multi-input single output data.

47. (Currently Amended) Apparatus according to claim 1922, wherein said data sequence comprises a sequence of financial data, behavior patterns and wherein said comparator is configured for providing said comparison result as a forecast of financial behavior.

48. (Currently Amended) Apparatus according to claim 1922, wherein said data sequence comprises a time sequential image data sequences, and wherein said comparator is configured for providing said comparison result as an identification of features of interest in an image data-said model being usable to determine a statistical distance therebetween.

49. (Original) Apparatus according to claim 48, said image data comprising medical imaging data, said statistical distance being indicative of deviations of said data from an expected norm.

50. (Currently Amended) Apparatus according to claim 1922, wherein said data sequence comprises a sequence of records arriving at applicable to a database, and wherein said comparator is configured to perform data mining on said database.

51. (Currently Amended) A computer implementing a method for building a stochastic model of a data sequence, said data sequence comprising time related symbols selected from a finite symbol set, the method comprising:

receiving said data sequence, wherein said data sequence describes ongoing states of an observed process,

expressing said symbols as a series of counters within nodes, each node having a counter for each symbol, each node having a position within said tree, said position expressing a symbol sequence and each counter indicating a number of its corresponding symbol which follows a symbol sequence of its respective node,

reducing said tree to an irreducible set of conditional probabilities of relationships between symbols in said input data sequence, thereby to generate a stochastic model of said sequence, and

comparing said stochastic model with a previously obtained reference model so as to determine if there has been a statistical change between the two models, and for outputting a result of an analysis of said monitored process in accordance with said comparing,

wherein said data sequence comprises one of a group consisting of: a manufacturing process output data sequence, a cyclic operating machine data sequence, a buffer level data sequence, a seismological data sequence, a medical sensor output data sequence, a sequence of financial data, a sequence of records arriving at a database, and an image data sequence.

52. (Previously Presented) The apparatus of claim 1, wherein said tree reducer is further configured to update said reference tree according to data in said reduced tree.

53. (Previously Presented) The apparatus of claim 1, wherein said trees represent non-homogeneous data.

54. (Previously Presented) The apparatus of claim 19, wherein said stochastic modeler is further configured to update said reference model according to data in said stochastic model.

55. (Previously Presented) The apparatus of claim 19, wherein said models represent non-homogeneous data.

56. (Previously Presented) The apparatus of claim 51, wherein said method further includes updating said reference model according to data in said stochastic model.

57. (Previously Presented) The method of claim 51, wherein said models represent non-homogeneous data.

58. (Previously Presented) Apparatus according to claim 1, further comprising an observation unit configured for generating said data sequence from measurements of one or more tangible objects.

59. (Previously Presented) Apparatus according to claim 19, further comprising an observation unit configured for generating said data sequence from measurements of one or more tangible objects.

60. (Previously Presented) Apparatus according to claim 1, wherein said method further comprises generating said data sequence from measurements of one or more tangible objects.

61. (New) Apparatus according to claim 1, wherein said comparison result is provided as a control chart.

62. (New) Apparatus according to claim 1, wherein said data sequence comprises a sequence of records arriving at a database, and wherein said comparator is configured for providing said comparison result as an identification of changes in a source generating said records.

63. (New) Apparatus according to claim 1, wherein said data sequence comprises a sequence of records arriving at a database, and wherein said comparator is configured to perform data mining on said database.